What is claimed is:

1. A method for converting directly synthesis gas to hydrocarbons with high diesel distillates content through Fischer-Tropsch process, wherein:

(1) the synthetic fuels with diesel distillates as primary products are produced through one-step synthesis technique from synthesis gas;

(2) synthesis gas is composed of hydrogen and carbon monoxide with the mole ratio of hydrogen to carbon monoxide within the range of 1 to 4;

(3) activated carbon supported cobalt based catalysts were employed;

(4) synthesis conditions comprise reaction temperature within the range of 120 to 400℃, reaction pressure within the range of 0.5 to 10.0 MPa, volume hourly space velocity of mixture of hydrogen and carbon monoxide within the range of 100 to 5000.

2. A method of claim 1, wherein said Fischer-Tropsch process is a non-shifting Fischer-Tropsch process over an activated carbon supported cobalt based catalyst.

3. A method of claim 1, wherein the diesel distillates useful as a diesel fuel heavier than gasoline or as a blending component for a distillate fuel comprising: 180 to 380℃ fraction directly synthesized from Fischer-Tropsch process and containing at least 95 wt % paraffins with an iso to normal ratio of about 0.03 to 0.3, <50 ppm (wt) of sulfur and nitrogen, less than about 2 wt % unsaturates, and about 0.001 to less than 0.3 wt % oxygen.

4. The method of claim 3, wherein the oxygen is present primarily as C_{12}^{+} linear alcohols.

5. The method of claim 3, wherein the diesel fuels are characterized by a cetane number of at least 60 to 70.

6. The method of claim 3, wherein the content of nitrogen and sulfur in fuels is less than or equal to 15 ppm (wt).

7. The method of claim 6, wherein the content of nitrogen and sulfur is less than or equal to 10 ppm (wt).

8. An equipment, useful in implementing the methods of claim 1 to 3, comprising:

line (1), which synthesis gas, the mixture of hydrogen and carbon monoxide in an appropriate ratio comes from,

purifier (2), where silica gel, 5Å molecular sieves and activated carbon are filled, and synthesis gas is first purified,

mass flow controller (3), controlling the velocity of stock feed,

pre-heater (4), heating the stock feed,

Fischer-Tropsch reactor (5),

trap(6), where 180-245℃ fraction is recovered,

trap(7), where 80-180℃ fraction is recovered,

trap(8), where 0-80℃ fraction is recovered,

filter (9), through which the heavier(e.g., 245℃$^+$ fraction) still stays in the slurry tank and slurry liquid (paraffin liquid waxes) are withdrawn periodically.

9. An equipment of claim 8, wherein the Fischer-Tropsch reactor (5) used is a slurry reactor.

10. An equipment of claim 8, wherein the activated carbon supported cobalt based Fischer-Tropsch catalyst is placed in the slurry reactor (5).

11. An equipment of claim 10, wherein the Fischer-Tropsch catalyst placed in the slurry reactor (5) is first reduced in a flow of hydrogen or mixture of hydrogen and carbon monoxide under conditions of the reduction temperature within the range of 250 to 500℃, reduction pressure within the range of 0.3 to 1.5 MPa, hydrogen volume hourly space velocity within the range of 100 to 1000.

12. An equipment of claim 9, wherein the agitator in the slurry reactors is run with the rotate speed within the range of 400 to 1000 r/min.